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BOOK OF ABSTRACTS

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PROCESSING, CHARACTERISATION AND
APPLICATION OF NANOSTRUCTURED
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First International Conference

PROCESSING, CHARACTERIZATION AND APPLICATION OF NANOSTRUCTURED MATERIALS AND NANOTECHNOLOGY

PROGRAMME

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Adsorption and photocatalytic degradation of Reactive Orange 16 dye with hydrothermally modified anatase

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Anatase is a well-known photocatalyst mostly used to degrade or transform organic and inorganic water pollutants. Its photocatalytical properties depend on surface area, availability of active sites, pore sizes, number and nature of trapped sites, as well as on adsorption/desorption characteristics. In order to reach the highest performance, the main challenge is to find new methods for anatase preparation or modification to achieve a balance between mentioned properties. In this work, hydrothermal treatments of anatase were carried out at 120, 150 and 180 °C during 6, 12 and 18 h in NaOH solution (c = 3 mol dm–3). The samples were characterized by X-ray powder diffraction (XRPD), scanning and transmission electron microscopy (SEM and TEM). The photocatalytic activity and efficiency of the samples were tested on Reactive Orange 16 (RO16) dye and compared to commercial P-25 powder (Degussa). The powders are coded as UT_t, where T is temperature of the treatment and t is duration of the treatment. XRPD analysis showed that phase composition of the samples remains the same and confirms absence of the reaction between anatase and NaOH, which would result in formation of a sodium-titanate. Nanoparticles of modified anatase form soft m, as SEM analysis showed μagglomerates that differ in size 1 – 5 Size of modified nanoparticles is about 5 nm what is observed by TEM. It is also found that formation of anatase nanotubes, with lengths 100 – 250 nm, is started. The adsorption power of U120_18 and U150_6 samples is twice as much as adsorption power of P-25 powder. The samples U150_12 and U180_6 have adsorption power very similar to P-25, while all other samples show much lower adsorption power. The photocatalytic activity of all modified samples is lower than phtocatalytic activity of P-25, but because of higher adsorption power the overall efficiency of RO16 degradation in water with U120_18 and U150_6 samples is comparable to the efficiency of P-25 powder.